

Platinum bioaccumulation kinetics in marine bivalve (oyster *Crassostrea gigas*) – a potential sentinel species for TCEs

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Platinum Group Elements (PGEs) are extremely scarce in the Earth's Crust and of strong interest for high-end technologies due to their specific properties. These peculiar characteristics make them so-called Technology Critical Elements (TCEs). The anthropogenic geochemical cycle of Platinum (Pt) has surpassed the natural cycle, yet environmental Pt levels are still in the sub picomolar to nanomolar range, making its analytical detection a challenge. Few studies cover the behaviour of Pt in marine waters from its speciation, dynamics to possible transfer to the biota.

Oysters (*Crassostrea gigas*) from a reference estuary were exposed to stable isotope ¹⁹⁴Pt in seawater at a range of environmentally relevant concentrations during 35 days. Seawater was renewed spiked to the three nominal concentrations i.e. 50, 100, and 10 000 ng/L each day for two replicate series. Control conditions were also monitored. Five oysters from each tank were dissected after 3, 7, 14, 21, 28, 35 days of Pt exposure, freeze-dried and analyzed by ICP-MS. Biological responses to Pt exposure were investigated by measuring Pt content in faeces and pseudo-faeces as well as Pt distribution in organs, and several histological parameters.

Results show concentration-dependent accumulation of total Pt in oysters increasing with exposure time: After only three days of exposure, oyster tissues from the low and intermediate exposure conditions show concentrations already ten times higher than control oysters. After 35 days of exposure, bioconcentration factors (BCF), reached similar values of 500 L.kg⁻¹ for low and intermediate exposure, whereas clearly higher BCF in high exposure conditions (1700 L.kg⁻¹) suggest reduced absorption control. Differences in Pt accumulation and biomarker responses occurred between tissues. Overall, a simple correlation seems to exist between seawater concentrations and Pt content in oysters. These results suggest that oysters may serve as sentinels of Pt concentrations in seawater, representing a valuable tool in order to ensure Pt biomonitoring in coastal waters.